

### Claims

What is claimed is:

1. A recommendation system for delivering a list of recommendations to a requester system over a computer network, the recommendation system comprising:

a plurality of producer modules in communication with the requester system, each of the plurality of producer modules receiving a request for recommendations from the requester system and producing a list of initial recommendations in response thereto, each of the recommendations in a list of initial recommendations including a confidence level and a producer identifier; and

a recommendation engine comprising:

a weighting module modifying each of the confidence levels in a given list of initial recommendations based on a weighting value associated with the producer module that produced the given list of initial recommendations;

a recommendation module selecting one or more of the recommendations from the lists of initial recommendations based on the confidence levels of the recommendations to produce a list of survived recommendations that are transmitted to the recommender system; and

an adjustment module adjusting the weighting values associated with each of the producer modules based on information from the requester system related to the list of survived recommendations transmitted to the requester system.

2. The recommendation system of claim 1, wherein the recommendation module further comprises:

an assembler module combining the lists of initial recommendations into a combined list of recommendations;

a sorting module sorting the recommendations in the combined list of recommendations according to the confidence levels of each of the recommendations in the combined list of recommendations to produce a sorted list of recommendations; and

a selection module selecting one or more survived recommendations from the sorted list of recommendations to produce the list of survived recommendations.

3. The recommendation system of claim 2, wherein the selection module:

selects a first predetermined number N of recommendations from the sorted list of recommendations;

selects a second predetermined number M of recommendations from the first predetermined number N of recommendations, wherein the likelihood of a given one of the M recommendations being selected from the first predetermined number N of recommendations is related to the confidence level of the given one of the M recommendation; and

selects the one or more survived recommendations from the second predetermined number of initial recommendations.

4. The recommendation system of claim 3, wherein the first predetermined number N is characterized by the equation  $N = 2*i + 1$ , wherein i is a predetermined number.

5. The recommendation system of claim 4, wherein i is a number of recommendations to be transmitted in the list of relevant recommendations, wherein i is transmitted to the relevancy module from the requester system, and wherein M equals i.

6. The recommendation system of claim 1, wherein the weighting module modifies each of the confidence levels in a given list of initial recommendations by multiplying each of the confidence levels in a given list of initial recommendations by the weighting value associated with the producer module that produced the given list of initial recommendations.

7. The recommendation system of claim 1, wherein each of the recommendations in a list of initial recommendations also includes an object identifier.

8. The recommendation system of claim 1, wherein at least one of the recommendations in a list of initial recommendations also includes a request identifier that identifies the request for recommendations from the requester system.

9. The recommendation system of claim 1, wherein at least one of the recommendations in one of the lists of initial recommendations also includes a session identifier that identifies a session on the requestor system.

10. The recommendation system of claim 1, wherein at least one of the recommendations in one of the lists of initial recommendations also includes a recommendation identifier that indicates the list of initial recommendations of which the recommendation was a part.

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11. The recommendation system of claim 1, wherein at least one of the recommendations in one of the lists of initial recommendations also includes a uniform resource locator (URL).

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12. The recommendation system of claim 1, wherein at least one of the recommendations in one of the lists of initial recommendations also includes a title of a web page.

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13. The recommendation system of claim 12, wherein at least one of the recommendations in one of the lists of initial recommendations also includes a summary of the web page being recommended.

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14. The recommendation system of claim 12, wherein at least one of the recommendations in one of the lists of initial recommendations also includes an image.

15. The recommendation system of claim 1, wherein the request includes a requester agent.

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16. The recommendation system of claim 11, wherein the request includes a universal resource locator key (URL Key).

17. The recommendation system of claim 1, wherein the request includes a Site Identifier (site ID).

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17. The recommendation system of claim 1, wherein the request includes a tracking identification attribute (Track ID).

18. The recommendation system of claim 17, wherein the Track ID is a session identifier.

19. The recommendation system of claim 17, wherein the Track ID is a user identifier.

20. The recommendation system of claim 1, wherein the request includes a request number (RecCount) indicating a number of request to be transmitted to the requester system.

22 21. A relevant object determination system for delivering relevant objects over a computer network to a requester system having one or more users in contact therewith, comprising:

5 a first producer module and a second producer module, each of the first and second producer modules receiving a request for relevant recommendations from the requester system, the first producer module producing a first list of recommendations in response to the request for relevant recommendations and the second producer module producing a second list of recommendations in response to the request for relevant recommendations, each recommendation including an object identifier, a confidence level, and a producer identifier; and

10 a recommendation engine comprising:

a weighting module modifying the confidence level in each recommendation in the first list of recommendations based on a first weighting value and modifying the confidence level in each recommendation in the second list of recommendations based on a second weighting value;

15 a recommendation module, selecting a predetermined number of the recommendations, the recommendation module delivering to the requester system objects identified by the object identifiers in the predetermined number of recommendations and the producer identifiers in the predetermined number of recommendations; and

20 an adjustment module adjusting the first weighting value and the second weighting value based on inputs from the requester system indicative of reactions of the one or more users to objects sent from the recommendation module to the requester system.

23 21. The relevant object determination system of claim 20, wherein the  
25 recommendation module further comprises:

an assembler module combining the first list of recommendations and the second list of recommendations into a combined list of recommendations;

a sorting module sorting the combined list of recommendations to produce a sorted list of recommendations; and

30 a selection module selecting from the sorted list of recommendations the predetermined number of recommendations.

22. The relevant object determination system of claim 21, wherein the sorting module sorts the recommendations in the combined list of recommendations according to confidence levels.

5 23. The relevant object determination system of claim 22, wherein the selection module first selects N recommendations from the sorted list of recommendations and then selects the predetermined number of recommendations from the N selected recommendations, wherein the likelihood of a given one of the recommendations of the predetermined number of recommendations being selected from the N recommendations is related to the confidence level  
10 of the given one of the recommendations.

24. The relevant object determination system of claim 23, wherein N is characterized by the equation  $N = 2 \cdot i + 1$ , and wherein i is a predetermined number.

25. A method of adaptively weighing producer modules in a recommendation system employing a plurality of producer modules, each producer module having a weighting value associated therewith, the method comprising the steps of :

receiving one or more recommendations from each of the plurality of producer modules,  
5 each of the received recommendation including a producer identifier indicating which producer module produced the received recommendation;

transmitting a plurality of survived recommendations to a requester system, each of the survived recommendations being selected from the received recommendations;

receiving information from the requester system related to the plurality of survived  
10 recommendations transmitted to the requester system;

modifying each of the weighting value based on the information received from the requester system.

26. The method of claim 25, wherein the information received from the requester  
15 system includes a plurality of user reaction values, wherein each of the plurality of user reaction values is associated with a different one of the plurality of survived recommendations transmitted to the requester system.

27. The method of claim 26, wherein each user reaction value is indicative of a  
20 positive user reaction to the recommendation to which the user reaction value is associated.

28. The method of claim 26, wherein each user reaction value is indicative of positive and negative user reactions to the recommendation to which the user reaction value is associated.

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29. A method of producing a list of recommendations using a plurality of producer modules, each producer module having associated therewith a weighting value, the method comprising the steps of:

receiving a request for recommendations from a requester system;

5 transmitting the request to a plurality of producer modules;

receiving a list of initial recommendations from each of the producer modules, every recommendation in a list of initial recommendations having a confidence level and a producer identifier;

10 modifying each of the confidence levels in each of the lists of initial recommendations based on the weighting value associated with the producer module that produced the list of initial recommendations to produce a list of modified recommendations;

selecting a predetermined number of survived recommendations from the list of modified recommendations;

15 transmitting the predetermined number of survived recommendations to the requester system;

receiving feedback information from the requester system related to the predetermined number of survived recommendations transmitted to the requester system; and

20 modifying each of the weighting values based on the feedback information received from the requester system.

30. The method of claim 29, wherein the step of selecting a predetermined number of survived recommendations comprises the steps of:

25 sorting the list of modified recommendations according to the confidence levels of each of the recommendations in the list of modified recommendations to produce a sorted list of recommendations; and

choosing the selected predetermined number of survived recommendations from the sorted list of recommendations.

31. The method of claim 30, wherein step of choosing the selected predetermined number comprises the steps of:

30 selecting a first predetermined number N of recommendations from the sorted list of recommendations;



selecting a second predetermined number M of recommendations from the first predetermined number N of recommendations, wherein the likelihood of a given one of the M recommendations from the first predetermined number N of recommendations being selected as a second predetermined number M of recommendations is related to the confidence level of the given recommendation; and

choosing the selected predetermined number of survived recommendations from the second predetermined number M of initial recommendations.

32. The method of claim 31, wherein the first predetermined number N is characterized by the equation  $N = 2*i + 1$ , wherein i is a predetermined number.

33. The method of claim 29, wherein the step of modifying each of the confidence levels comprises multiplying each of the confidence levels in a given list of initial recommendations by the weighting value associated with the producer module that produced the given list of initial recommendations.

34. The method of claim 29, wherein each of the recommendations in a list of initial recommendations also includes an object identifier.

35. The method of claim 29, wherein at least one of the recommendations in a list of initial recommendations also includes a request identifier that identifies the request for recommendations from the requester system.

36. The method of claim 29, wherein at least one of the recommendations in a list of initial recommendations also includes a session identifier that identifies the session on the requestor system that motivated the initial request.

37. The method of claim 29, wherein at least one of the recommendations in a list of initial recommendations also includes a recommendation identifier that indicates the list of initial recommendations of which the recommendation was a part.

38. The method of claim 29, wherein at least one of the recommendations in a list of initial recommendations also includes a uniform resource locator (URL).

39. The method of claim 38, wherein the at least one of the recommendations in a list of initial recommendations also includes a uniform resource locator key (URL key) related to the URL.

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40. The method of claim 29, wherein at least one of the recommendations in a list of initial recommendations also includes the address of a web page.

41. The method of claim 40, wherein the at least one of the recommendations in a list of initial recommendations also includes a title of the web page.

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42. The method of claim 41, wherein the at least one of the recommendations in a list of initial recommendations also includes a summary of the contents of the web page.

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43. The method of claim 29, wherein at least one of the recommendations in a list of initial recommendations also includes an image.

44. The method of claim 29, wherein the request includes a requester agent.

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45. The method of claim 29, wherein the request includes a standard universal resource identifier.

46. The method of claim 29, wherein the request includes a Site Identifier (site ID).

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48. The method of claim 29, wherein the request includes a tracking identification attribute (Track ID).

49. The method of claim 29, wherein the Track ID is a session identifier.

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50. The method of claim 29, wherein the Track ID is a user identifier.

51. The method of claim 29, wherein the request includes a request number (RecCount) indicating the predetermined number of survived recommendations to be transmitted to the requester system.

5 52. The method of claim 32, wherein the request includes a request number (RecCount) indicating the predetermined number of survived recommendations to be transmitted to the requester system.

53. The method of claim 52, wherein  $i$  equals the request number.

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